

SIMULTANEOUS TELEPHONE RING
APPARATUS AND METHOD

5 BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention relates generally to telephone communication systems, and more particularly, the present invention relates to a simultaneous telephone ring system and method.

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2. Description of the Related Art

Trends such as telecommuting, virtual offices, contract employment, etc. have led to the proliferation of both land-based and cellular phone services. It is not uncommon for a person to have different telephone numbers at their corporate office, their home office, their home, and one or more cell phone numbers. Callers are therefore often required to dial multiple numbers in order to reach a person. This is not only a waste of time, but expensive. A number of prior "simultaneous ring" systems have been proposed.

One type of known simultaneous ring system relies on an Advanced Intelligent Network (AIN), which is a computer (or set of computers) that is integrated into the (typically Signaling System Seven (SS7)) control network of a phone company. For example at Cincinnati Bell Telephone, an AIN system has been programmed to implement a simultaneous ring service. When a call to a telephone number with the simultaneous ring service is placed on the SS7 telephone network, the AIN looks up the associated target telephone numbers in a database and rings each number. If one of the phones is answered, a talk path is established and the calls to the other target telephone numbers are terminated. This arrangement, however, has several drawbacks. AIN systems are very expensive, complicated, and difficult to maintain. The AIN system also has to be integrated into the SS7 telephone network and therefore has to be implemented by the phone company.

Another type of known simultaneous ring system relies on a PBX or some other type of central switching device which associates one or more target phone numbers with an incoming telephone number. When a telephone call on the incoming

number is received, the central switching device places a call to each of the target phone numbers. If one of the target phone numbers is answered, a link through the switching device to the target number is established. This arrangement, which is sometimes referred to as "conferencing" or "bridging", requires the central switch to
5 maintain the link for the entire duration of the telephone call. Consequently conferencing or bridging is expensive because phone service charges are accrued during the entire duration of the phone call.

A simultaneous ring system and method that connects to a telephone company network over a standard end-user service line and which performs a call transfer using
10 the telephone company network when a connection is made with a target phone number, thereby avoiding conferencing or bridging, is therefore needed.

SUMMARY OF THE INVENTION

5 The present invention relates to an apparatus and method for providing simultaneous ring services for a telephone number associated with an end-user line of a telephone network. The system includes a simultaneous ring system configured to couple the incoming caller line to the answering (or default) end-user line of the telephone network. In response to receiving an incoming call on the user-line, the simultaneous ring system simultaneously rings target phone numbers associated with the telephone number and then transfers the telephone call to the telephone network if
10 a connection to one of the target phone numbers is made. If a connection is not made (i.e., the call is not answered), the incoming call is transferred to the user's default target, which is typically their Voice Mail. These and other advantages of the present invention will become apparent upon reading the following detailed descriptions and studying the various figures of the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention may best be understood by reference to the following description taken in conjunction with the accompanying drawings in which:

5 Figure 1 is a diagram of the simultaneous ring system of the present invention coupled between a telephone company phone network and the Internet.

 Figure 2 is a block diagram of the simultaneous ring system of the present invention.

10 Figure 3 is block diagram of simultaneous ring modules contained within the simultaneous ring system.

 Figure 4 is a flow diagram illustrating the operation of the simultaneous ring system of the present invention.

 Figure 5 is a block diagram of a database hierarchy used in the simultaneous ring system of the present invention.

15 Figure 6 is a block diagram of a network of simultaneous ring systems according to one embodiment of the present invention.

20 Figures 7A through 7J are screen shots of exemplary web pages hosted by the simultaneous ring system for signing up for the simultaneous ring service and administering an existing account on the simultaneous ring service of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Referring to Figure 1, a diagram of the simultaneous ring system 10 of the present invention is shown coupled between a telephone network 12 and the Internet 14. A standard user telephone line 16 is used to connect the phone network 12 and the simultaneous ring system 10. The phone network 12 includes a plurality of switching stations 18a - 18n connected together in an arrangement commonly called a Signaling System 7 (SS7) network used for call set-up and disconnect. As is well known in the art, the SS7 network is used for establishing a call path between a caller and a target phone number. A separate voice path network is used once the call path is established. The simultaneous ring system 10 is also coupled to the Internet 14 either indirectly through an Internet Service Provider (not shown) or directly. In either arrangement, the Internet 14 allows Internet users to access the simultaneous ring system 10 for a variety of reasons, such as to sign-up for the simultaneous ring service or to update an existing simultaneous ring account, as is described in greater detail below.

Referring to Figure 2, a block diagram of the simultaneous ring system 10 is shown. The simultaneous ring system 10 includes a voice card 30 coupled to the user telephone line 16, a server 32 including a hardware driver 34 and simultaneous ring software 36 to control operation of the simultaneous ring system 10, a relational database 38 for storing subscriber record information and target telephone number information, and a web server 40 coupled between the database 38 and the Internet 14. In one embodiment, the voice card is a model D480/SC-2T1 from Intel Corporation (Dialogic Subsidiary), Santa Clara, CA. The user telephone line 16 is an Integrated Services Digital Network (ISDN) line with Two B-Channel Transfer (TBCT) capability. For example the user telephone line 16 may be a "Primary Rate Interface (ISDN-PRI)" twenty-three B-Channel and one D-Channel line with six lines used for incoming calls and seventeen lines used for outgoing calls. In alternative embodiments, other types of user telephone lines 16 may be used, such as ISDN PRI European Standard and ISDN Basic Rate Interface (BRI). The hardware driver 34 provides an interface between the voice card 30 and the server 32. The database 38 is accessible by both the server 32 and by Internet users through the web server 40. In alternative embodiments, the number of channels provided on the user telephone line 16 may vary depending on the number of subscribers to the

simultaneous ring system 10 and the amount of incoming telephone calls. In the situations where the number of subscribers and incoming telephone call traffic is high, multiple user telephone lines 16 and voice cards 30 may be needed.

5 In one embodiment, the user telephone line 16 provides a Primary Rate Interface (PRI) service between the telephone network 12 and the simultaneous ring system 10. With the PRI service, a large number of telephone numbers (i.e., 500 or more) are associated with the telephone line 16. Telephone calls received by the telephone network 12 corresponding to the PRI telephone numbers are offered to the simultaneous ring system 10. With this arrangement, a simultaneous ring subscriber is
10 assigned to one of the PRI telephone numbers. One telephone line 16 can therefore service multiple simultaneous ring subscribers. If the number of subscribers exceeds the number of telephone numbers associated with the PRI service, then additional simultaneous ring systems 10 and/or telephone lines 16 with PRI service may be added in a modular fashion so that any number of subscribers can be serviced by any
15 of the simultaneous ring systems and/or telephone lines with PRI service.

Referring to Figure 3, a block diagram of the modules contained in the simultaneous ring software 36 is shown. The simultaneous ring software 36 includes an incoming call manager 50, an outgoing call manager 52, and a call manager 54. The incoming call manager 50 handles inbound call notification by passing the SS7
20 signal received on one of the incoming channels of the user telephone line 16 to the call manager 54 and generates a ringing signal so that the caller hears a ring. The call manager 54 performs a first query of the database 38 to determine if the incoming call is to a telephone number that belongs to a valid subscriber and a second database query to look up the target phone numbers if the telephone number belongs to a valid
25 subscriber. Assuming a valid subscriber, the outgoing call manager 54 initiates the SS7 calls on the outbound channels of the user telephone line 16 for each of the target telephone numbers. When one of the target telephone numbers is answered or goes into some type of voice mail or automated answering machine system (through a PBX system or otherwise), the telephone network 12 notifies the outgoing call manager 52
30 that a call path connection has been made. In turn, the call manager 54 is notified of the connection and causes a Two-B Channel Transfer (TBCT) between the incoming caller and the connected outgoing line. When this occurs, the simultaneous ring system 10 is switched out of the connection. Consequently the simultaneous ring system 10 does not perform conferencing or bridging. In accordance with another

embodiment, the simultaneous ring system 10 may maintain the connection between the caller and the target telephone number for the duration of the call if conferencing or bridging is desired.

In yet another embodiment, the outgoing call manager 52 may be configured to initiate the outgoing calls at various times to compensate for different set-up times of the target telephone numbers so that they all ring at substantially the same time. For example, a local call to a land-based phone typically takes approximately 750 milliseconds to establish a connection and to start ringing whereas a connection for long distance call may require 1,250 milliseconds or a call to a cell phone may require 4,250 milliseconds. Accordingly, the outgoing call manager 52 can be configured to introduce a dynamic delay before initiating calls to local land-base telephones until a ringing signal is detected from all the target cell phone and/or long distance telephone numbers. Alternatively, the outgoing call manager can be programmed to a configurable fixed delay so that all the target phone numbers ring at substantially the same time. For example, a call to a local land based phone may be delayed 3,500 milliseconds so that it may simultaneously ring with a target cell phone. It should be noted that the aforementioned dynamic and fixed delays are only exemplary and that a delay of any time period may be used to achieve substantial simultaneous ringing.

Referring to Figure 4, a flow diagram 60 illustrating the operation of the simultaneous ring system 10 is shown. Initially the simultaneous ring system 10 receives an incoming call (step 62) over the user telephone line 16. The simultaneous ring software 36 decodes the phone number (step 64) and then queries the database 38 (step 66) to determine if the phone number belongs to a subscriber (decision diamond 68). If the phone number does not belong to a subscriber, the processing of the incoming call is terminated (step 72). If the phone number belongs to a subscriber, the simultaneous ring system 10 then determines if the subscriber is valid (decision diamond 72). If the subscriber is not valid, the system terminates the call processing (step 74). If valid, the system 10 again queries the database 38 for the target telephone numbers associated with the incoming telephone number (step 76). Next the simultaneous ring system 10 initiates calls to the target cell phone numbers (if present), the long distance numbers (if present) (step 78) and the local land-based phone numbers (if present) (step 80). Depending on the embodiment used, the system 10 may introduce either a dynamic and/or a configurable delay (step 80) before initiating the calls to the land-based local numbers so they may ring substantially

simultaneously with the long distance calls or cell phone calls. Once the target phone numbers are called, the system 10 determines if one of the targets is answered (decision diamond 82). If yes, a Two B Channel Transfer (TBCT) to the target that answered is performed (step 84). If no target answers before the predetermined threshold expires (decision diamond 86), then a Two B Channel Transfer to the default target telephone number (step 88) is performed. When the Two B Channel Transfer occurs, the calls to the other targets are terminated (step 90) and the processing of the incoming call is complete (step 92).

Referring to Figure 5, a block diagram illustrating the database hierarchy 100 of the database 38 is shown. The database 38 includes a plurality of account records 102. Each account record includes information related to a billing entity for a subscriber. For example, if the billing entity is an individual, the account record 102 typically includes the billing address, information on how to bill the account (i.e. a credit card that is billed every month), and whether the user has available credit to cover outgoing toll calls to target long distance or international numbers. With corporate accounts, the account record 102 also includes billing information, available credit, and how many subscribers are associated with the corporate account. In addition, the each account record 102 includes a pointer 104 to one or more subscriber records 106. Each subscriber record 106 includes the subscriber's name, email address, user-defined password, other personal information, and a flag which determines if the subscriber is valid or not. If the account record 102 is for an individual, then only one subscriber record 106 is provided. On the other hand, if the account record 102 is for a corporation, business or other organization or entity, then multiple subscriber records 106 are provided, one for each subscriber. Each subscriber record 106 also includes a pointer 108 to a service record 110. The service record 110 includes the primary telephone number assigned to the subscriber, the target telephone number(s), associated with the primary number, and information related to each target phone number (i.e., cell, long distance, international, etc.).

Referring to figure 6, a block diagram of a network 120 of simultaneous ring systems 10 is shown. Specifically in this example, simultaneous ring systems 10a, 10b, and 10c are provided for area codes 650, 408 and 415 respectively. A master database 122, which includes all of the account records 102, subscriber records 106 and service records 110 for the entire system 120, is coupled to each of the simultaneous ring systems 10a, 10b and 10c respectively. The database 38 in each

simultaneous ring system 10a, 10b, and 10c includes a second copy of the subscriber records 106 and service records 110 for subscribers having a primary number within the 650, 408, and 415 area code respectively. With this arrangement, an Internet user can access the master database 120 via a single web portal over the Internet 14 and sign up for the simultaneous ring service or manage an existing account, regardless of which area code they live in. For example, when a subscriber living in the 415 area code creates or updates an account, the account information is written into the master database 122 and into the local database 38 within the system 10a. Thus a regional, nation-wide or even a global simultaneous ring system can be implemented and accessed from a single web page portal. It should be noted that the embodiment shown in Figure 6 is only exemplary. In area codes with many local exchanges, a similar arrangement with one or more systems 10 for each exchange may be provided.

Referring to figures 7A through 7J, a series of web pages illustrating the sign-up and administration of an account on the simultaneous ring system 10 is shown. In Figure 7A, a home page describing the simultaneous ring system 10 is shown. Also provided is a "Get Service Now" icon and a "Subscribers" icon. It should be noted that the web pages of Figure 7A through 7J are only exemplary and other web pages with the same or a different look, feel, and sequence could be used.

When the Get Service Now icon is selected, the web page illustrated in Figure 7B is displayed. This web page enables the user to become a subscriber by completing and submitting the name, email, password, city, etc. data entry fields. When this information is correctly entered using the "Continue" icon, the web page of Figure 7C appears. With this page, the user selects their primary telephone number. In the embodiment shown, standard numbers are provided at one price and more desirable "premium" numbers are provided at a higher price. In one embodiment, the displayed numbers are affiliated with the ISDN PRI (or group of PRI telephone connections) associated with the standard telephone line 16. Once a primary number is selected and entered by clicking the "Continue" icon, the web page of Figure 7D appears. With this page, the user is required to enter their target phone numbers and indicate if each number is cellular or not and if voice mail is associated with the number. Generally only one entered number has voice mail and this number becomes the user's "default" number. When this information is entered using the "Continue" icon, the web page of Figure 7E appears. With this page, the user is required to enter their credit card, address, and other billing information. Again when the user enters this information

using the "Continue" icon, the web page of Figure 7F appears. On this page, the user is presented with a text message of the cost of the service, billing procedures, etc. and an "Activate" icon. When the Activate icon is selected, all the information previously entered is written into the various records of the database 38 and the user becomes a subscriber.

When the Subscribers icon is selected, the web page of Figure 7G appears. This page requests a subscriber to enter their simultaneous ring (e.g. their primary) number and their previously defined password. Once this information is entered using the "Secure Logon" icon, the web page of Figure 7H appears. This page enables the subscriber to change or add additional target numbers. Similarly the web page of Figure 7I allows the subscriber to update their personal information and the web page of Figure 7J allows the subscriber to update their billing information.

Although only a few embodiments of the present invention have been described, it should be understood that the present invention may be embodied in many other specific forms without departing from the true spirit or the scope of the invention. Therefore, the present examples are to be considered as illustrative and not restrictive, and the invention is not to be limited to the details given herein, but may be modified within the scope of the appended claims.